

about that date. At selected stations and courses, however, the survey may be conducted monthly or at frequent intervals to furnish the data for supplementary forecasts prior and subsequent to the main forecast.

The task is rather large and must be approached cautiously. The establishment of new courses will take some time. The selection must of course be made in the winter when the snow is there and when the suitable location of shelter huts, etc., can only be made. Little more than reconnaissance can therefore be expected in the coming winter for the new stations. The following summer the shelter huts can be built and stocked and the courses carefully marked in preparation for the actual

surveys the following winter. In the meantime, however, there is much that can be done in the way of securing standardization and distribution of equipment, organization of personnel, preparation of standard forms, arrangements for cooperation with existing surveys and standardization of them as to methods, reports, equipment, etc.

This may serve to give you some idea of the project and what lies before us. As I stated in the beginning, when the results of two or more years are behind us we may be able to bring to you, should you desire it, something of greater interest to a scientific body of this nature than the mere prospectus of a project.

NOTES, ABSTRACTS, AND REVIEWS

Origin of nor'westers.—During spring and summer Bengal is occasionally visited by a type of severe thunderstorms locally known as the *Kal-Baisakhi*, or the "fateful thing" of the month of *Baisakh* (April 15–May 15). These storms usually approach a station from the north-west and burst suddenly with great fury. The path of a nor'wester may vary in width from a few hundred feet to a mile, and the distance overrun seldom exceeds 50 miles. These storms are more frequent in the late afternoon, although they are known to occur also at other times of the day. A nor'wester is always associated with a thundershower, and the precursory signs of its approach are the same as those which herald the coming of a violent thunderstorm.

During last summer one of us (G. Chatterji) led an expedition to south Bengal to study the upper air condi-

per km. On all the three occasions the "overrunning" took place in the southeastern quadrant of a low-pressure area which developed a "wind-shift line" more or less defined.

Thus the general conditions under which nor'westers occur in Bengal appear to be exactly similar to those giving rise to "tornadic" thunderstorms in the Mississippi Valley of the United States of America (Humphreys, "Physics of the air," p. 344). Upper air soundings on nor'wester days show that there is a marked increase in the absolute humidity of the southerly current from the Bay of Bengal in the afternoon. This probably explains why the nor'wester type of thunderstorms is more frequent during the afternoon than at any other hour of the day.—*S. C. Roy and G. Chatterji.*

A 24-monthly period of rainfall fluctuation in Saragossa.—A statistical examination of the monthly rainfall at Saragossa has revealed a well-marked periodicity of rather more than 24 months.¹ Saragossa is to the south of the Pyrenees in the valley of the river Ebro in the center of the Province of Aragon. In this region the summer and winter rains are about equal, but on the average the spring fall exceeds that of the summer and the autumn that of the winter. In order to eliminate this seasonal variation the rainfall values for successive 12 months have been examined for the period 1910 to 1924. When these values are plotted the recurrence of maximum values and minimum values at intervals of 12 months is clearly demonstrated. The periodicity is given as rather more than 24 months, although less than 25 months. It is also noted that harmonic analysis has not revealed the existence of smaller components of this value.

It is interesting to recall that in the case of our own country, where longer records are available, it has been shown that the 2-year recurrence is really compounded of two periodicities of 1.7 and 2.1 years, both of which have persisted with very little change through two centuries at least.—*J. Glasspoole.*

On the cause of banner clouds.—Dr. Roderick Peattie has recently described numerous observations of his on certain banner clouds in southern France.² He found no support for the explanation of banner clouds as a result either of reduced pressure in the lee of a peak which by expansional chilling of the passing air produces cloud, or from chilling of the wind by the peak. What he saw was the formation of convectional clouds in ascending currents of valleys in the lee of the wind at the level of the peak. These ascending currents, more humid than the

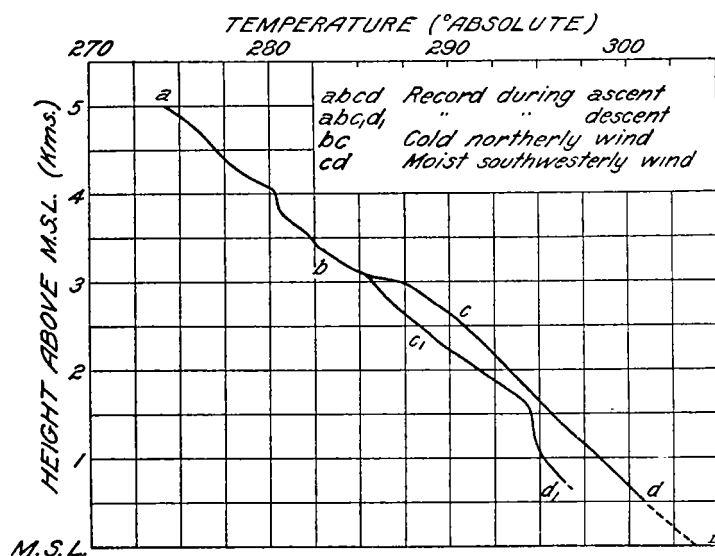


FIGURE 1.—Upper air soundings over Jhikargacha, Bengal, on May 17, 1929, at 17 hr. 35 m. I. S. T., just before a nor'wester

tions associated with nor'westers. On three occasions it was possible to collect some information from soundings by Dines and Chatterji meteorographs. A typical height-temperature graph obtained on one occasion just before the passage of a storm is reproduced in Figure 1. It appears that the nor'wester type of thunderstorms originates through the overrunning of a warm moist southerly or southwesterly wind by a westerly or northwesterly cold air with a high lapse rate. In the present case the cold air overran the moist air at 2.7 km. and extended to 3.3 km. The air in this layer had a superadiabatic lapse rate of 12° C. per km. while the air underneath was almost saturated and had a lapse rate of 5° C.

¹ Sobre un Periodo de unos veinticuatro meses para la fluctuación de la precipitación en Zaragoza, by José Domingo y Quilez; Madrid, An. Soc. Española Meteor., 2, 1928, pp. 9-15.

² R. Peattie, Nuages en bannière—Petite étude des vents et des nuages de montagne. Revue de Géographie Alpine, Vol. XVII, 1929, p. 329-335, 3 figs.

wind at the peak, would often be marked by cloud formation when the general wind was clear. These valley clouds ascended to the peak, and there their tops were blown out in banner formation. Doctor Peattie described how while warming himself in the sunlight on a mountain top he could put his hand into the banner cloud, so close did it hug the peak.—*C. F. B. 557.577.3*

The problem of aridity.—About one-third of the globe, with a rainfall averaging less than 10 inches a year, is actually desert, while another third, with less than 20 inches, is unfit or barely fit for agriculture. The existence of this vast area of unprofitable land is a thorn in the flesh of humanity, and there is an almost universal feeling, based partly on sentiment and partly on economic considerations, that more and more of it should be reclaimed and made fit for use and habitation. This feeling has found expression in the United States in the building of many costly dams, reservoirs, and irrigation canals in selected regions of the arid and semiarid West.

These elaborate installations appear, with some exceptions, to justify their existence on several grounds. They have brought extremely fertile soil under cultivation, they have permitted the raising on a large scale of crops that could not be so successfully raised, with or without irrigation, in other parts of the country, and, by making the land habitable, they have promoted the development of various industries and the utilization of natural resources that might otherwise have remained untouched.

Doubtless the conquest of the desert will go on, yet it seems likely that the next generation of Americans will devote an even larger share of attention to the task

of protecting regions of abundant rainfall from the occasional disaster of drought than to attempt to eke out a normally scanty rainfall elsewhere. Western Europe has set us an admirable example in the irrigation of humid lands. Thus France, with a rainfall normally sufficient in all parts of the country for the needs of agriculture, irrigates more than 6,000,000 acres of her soil, while Italy, another generally well-watered land, irrigates 4,500,000.—*C. F. Talman in "Why the Weather?" a Science Service Feature.*

Meteorological summary for Chile, September, 1929 (by J. Bustos Navarrete, Observatorio del Salto, Santiago, Chile).—In this month there was moderate activity in atmospheric circulation. Rains were rather rare in the central zone, but somewhat more frequent in the southern zone.

The main depressions bringing periods of unsettled weather and rain were charted as follows: 14th–18th, crossing the southern part of the continent, accompanied by rain in the southern and by cloudy, changeable weather in the central zone; 19th–21st, also crossing the extreme southern region and prolonging the period of unsettled conditions caused by the preceding depression. This latter storm brought general rains in the south and the rain extended as far north as Santiago on the morning of the 20th. Lastly, there was the depression of the 26th–29th, which affected conditions over the southern and central regions and was attended by generally foul weather and heavy rains from Chiloe to Aconcagua.

The most important anticyclonic centers accompanied by fine weather were mapped as follows: 2d–4th, 4th–5th, 7th–11th, and 23d–25th. All of these moved from southern Chile toward Argentina.—*Translated by W. W. R.*

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